

## Math 025

### Review Exercises for the Final Exam

The following are review exercises for the Math 025 final exam. These exercises are provided for you to practice or test yourself for readiness for the final exam. There are many more problems appearing here than would be on the final. These exercises represent many of the types of problems you would be expected to solve on the final, but are not meant to represent all possible types of problems that could appear on the final exam. Note for the final exam you must show **all** your work in order to receive full credit. Scientific calculators are permitted: graphing calculators or calculators with QWERTY keyboards are NOT permitted. Word problems must be done using algebraic methods to receive full credit.

#### 1. Evaluate:

- a)  $9 - 4 \cdot 3 - 7$
- b)  $15 - (7 \cdot 3 - 18)$
- c)  $18 - (3 \cdot 2 + 4)$
- d)  $6 - 4[7 + 2(1 - 5)]$
- e)  $5 - [4 - 7(2 - 8)]$
- f)  $3 - 7[2^2 - 3(2 - 5)]$

#### 2. Evaluate the following for $x = -3$ and $y = 2$ .

- a)  $|x - y| - x^2$
- b)  $|x + y| - |x| - |y|$
- c)  $(x - y)^2 - |x + 5|$
- d)  $(y - x) - (y - x)^2$
- e)  $\frac{y^2 - x^2}{y - x}$

#### 3. Simplify:

- a)  $2x(x - y) - 3(x^2 + 5xy)$
- b)  $5x(x^2 + y) - (x^3 - 3xy)$
- c)  $3x(x - y) - (x^2 + xy)$
- d)  $2 - [2x - (3x - 2)]$
- e)  $4 - 2[3x - (5x - 4)]$

4. Solve for  $x$ :

- a)  $2x + 3 = 5x - 4$
- b)  $x - 7 = 7 - x$
- c)  $3(x + 3) + 5 = 3x + 14$
- d)  $2x - 5(x - 2) = 20 - (2x + 6)$
- e)  $4(3x - 5) + 6 = 19 - 3(2x - 1)$
- f)  $5(x - 2) - 3(x + 4) = 2(x + 5)$

5. Solve for  $x$  and graph your solution on the real number line.

- a)  $5 - 3a > 38$
- b)  $5(a + 3) - 7a \geq 3$
- c)  $3(x - 3) - 5x \geq 15$
- d)  $5 - 3(x - 4) < 2(x + 1)$

6. Perform the operations and express your answer in simplest form with positive exponents only.

- a)  $(2x^3)^2 - (3x^2)^2$
- b)  $(2x^2)^3(-3x^2)^2$
- c)  $(-3xy^3)^3(2x^2y^4)^2$

7. Perform the operations and express your answer in simplest form with positive exponents only.

- a)  $\frac{-10x^3y^5}{4xy^6}$
- b)  $\frac{(2x^3y^2)^2}{8(xy^6)^2}$
- c)  $\frac{(2x^4)^2(xy^2)}{x^4y^4}$
- d)  $\frac{(3x^2)^3(xy^2)^2}{(6xy^2)^2}$

8. Perform the operations and express your answer in simplest form with positive exponents only.

a)  $\left(\frac{24xy^3}{5x^2y}\right)\left(\frac{15xy^2}{8x^2y^4}\right)$

b)  $\frac{8x^2y^3}{7xy^2} \div \frac{16xy^4}{21xy}$

c)  $\frac{12xy^3}{7x^2y} \div \frac{6x^2y^4}{21xy}$

d)  $\frac{3x^2}{2xy^2} + \frac{2y}{12xy}$

e)  $\frac{x}{7x^2y} - \frac{6}{21xy}$

9. Perform the operations and express your answer in simplest form with *positive exponents only*.

a)  $(x^{-1}y^0)^{-2}(y^{-2}x^2)^3$

b)  $(3x^2y^{-3})^{-3}(6x^{-3}y^5)^2$

c)  $\frac{x^4y^{-6}}{x^{-3}y^3}$

d)  $\frac{x^{-2}y^5}{x^{-4}y^{-3}}$

10. Evaluate:  $2^{-2} + (-2)^2 + 2^0$

11. Perform the operations and express your answer in simplest form.

a)  $(x - 3y)^2$

b)  $(x - 3y)(x + 3y)$

c)  $(2x - 5y)(3x + 2y)$

d)  $(x - 3y)(x^2 - 2y)$

e)  $(a + 6b)(a^2 - 3b)$

f)  $(x - y)(x^2 + xy + y^2)$

g)  $(2x + y)(4x^2 - 2xy + y^2)$

**12.** Perform the operations and express your answer in simplest form.

a)  $(a + 2b)(a - 2b) - 2a(a - 2b)$

b)  $(x - y)^2 - (x - y)(x + y)$

**13.** Convert the following into scientific notation and then perform the computations.

Show all work to receive full credit. Express your answer using scientific notation.

a)  $\frac{(120,000)(0.0005)}{0.06}$

b)  $\frac{(0.0002)(0.06)}{4,000}$

**14.** The mass of the earth is approximately  $5.98 \times 10^{24}$  kilograms. If one ton is 888.9 kilograms, what is the weight of the earth in tons?

**15.** Factor the following completely (if possible):

a)  $6x^2 - 4x - 2$

b)  $9x^2y - 16y^3$

c)  $3x^2y + 9xy + 6y$

d)  $5xy^2 + 25x^2y + 10xy$

**16.** Use long division to find the following:

a)  $(x^2 + 6x - 11) \div (x - 3)$

b)  $\frac{3x^2 + 5x - 10}{x - 4}$

c)  $\frac{5x^2 - 7x + 1}{x - 1}$

**17.** Reduce to lowest terms.

a)  $\frac{x^2 - 9}{x^2 - 3x}$

b)  $\frac{2x^2 + 9x - 5}{x^2 - 25}$

$$\text{c) } \frac{x^2 - 25}{x^2 - 10x + 25}$$

$$\text{d) } \frac{x^2 - y^2}{(x - y)^2}$$

**18.** Perform the operations and express your answer in simplest form.

$$\text{a) } \frac{1}{x} + \frac{1}{x-7}$$

$$\text{b) } \frac{3}{x+6} + \frac{5}{x-6}$$

$$\text{c) } \frac{x^2 + x - 6}{2x^2 + 6x} \cdot \frac{4x^3 + 8x^2}{x^2 - 4}$$

$$\text{d) } \frac{x^2 - y^2}{x^2 - xy} \div \frac{x + y}{2x}$$

$$\text{e) } \frac{x+1}{3x-3} - \frac{2}{x^2 - 1}$$

**19.** Solve for  $x$ .

$$\text{a) } \frac{x-3}{3} + x = \frac{4}{5}$$

$$\text{b) } \frac{x+1}{2} - x = \frac{3}{5}$$

$$\text{c) } \frac{3}{2}x - \frac{x+4}{3} = \frac{5}{6}$$

$$\text{d) } \frac{x+2}{5} - \frac{x-3}{4} = \frac{2}{3}$$

**20.** The length of a rectangle is 4 more than its width, and the ratio of the length to its width is 5 to 3. Find the dimensions of the rectangle. (Only algebraic solutions will receive credit.)

**21.** Show that the ordered pair  $(-3, -1)$  satisfies the equation  $2y - 4x = 10$ .

**22.** Does  $(x + y)^2 = x^2 + y^2$ ? Justify your answer for credit.

**23.** Sketch a graph of the following equations. Give the coordinates of the  $x$ - and  $y$ -intercepts of the graphs.

a)  $3x - 5y = 15$

b)  $5x + 4y = 20$

c)  $4x + 7y = 28$

**24.** Rewrite the following as a simple fraction reduced to lowest terms.

a)  $\frac{\frac{2}{y} - \frac{2}{x}}{\frac{1}{y^2} - \frac{1}{x^2}}$

b)  $\frac{1 - \frac{1}{a}}{\frac{1}{a} - \frac{1}{a^2}}$

c)  $\frac{\frac{1}{7} - \frac{7}{x^2}}{\frac{x+7}{x}}$

**25.** Express the following in simplest radical form:

a)  $\sqrt{8x^2y^3} \sqrt{2xy^2}$

b)  $(2\sqrt{5xy^5})(3\sqrt{50x^3y})$

c)  $2\sqrt{8} - 3\sqrt{50}$

d)  $\sqrt{48} - 2\sqrt{75}$

**26.** Write the following in simplest radical form:

a)  $\frac{12}{\sqrt{3y}}$

b)  $\frac{12x}{\sqrt{8}}$

c)  $\frac{6}{\sqrt{7} - \sqrt{5}}$

**27.** Solve by factoring:

a)  $x^2 - 3x - 28 = 0$

b)  $2a^2 - 11a = -12$

c)  $3x^2 + 13x + 4 = x^2 + 4x + 9$

**28.** Solve using the quadratic formula: *express your answer in simplest form.*

a)  $x^2 - 4x - 1 = 0$

b)  $x^2 + 3 = 8x + 1$

c)  $x^2 + 3x = 6$

**29.** Solve the following systems of equations:

a) 
$$\begin{cases} 3x + y = 0 \\ 5x + 2y = 2 \end{cases}$$

b) 
$$\begin{cases} 5x - y = 2 \\ 10x + 2y = 0 \end{cases}$$

c) 
$$\begin{cases} x - 2y = 16 \\ 4x - y = 1 \end{cases}$$

**30.** Bob's air-conditioning service charges \$50 for a service call plus \$30/hr for repair time.

a) Using  $t$  for time in hours and  $C$  for total cost, write an equation that describes how much Bob's would charge for a service call and repair.

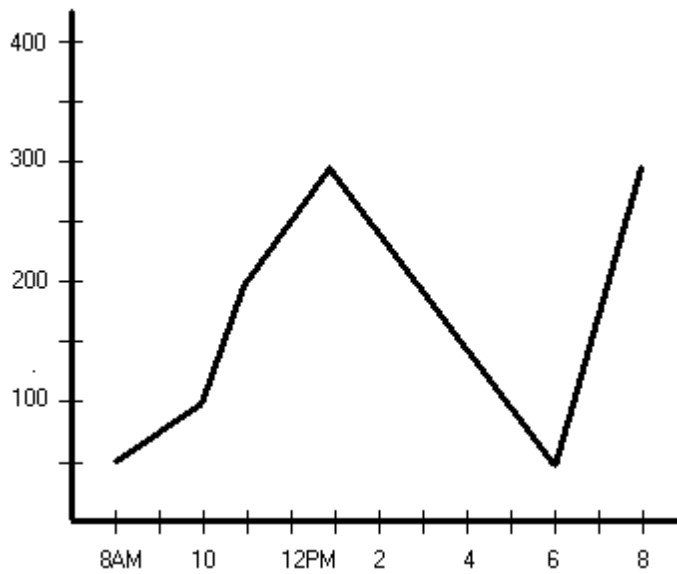
b) Solve explicitly for  $t$  in terms of  $C$  using your equation in part a).

**31.** A club bought a total of 280 orchestra and balcony tickets to an off-broadway show for a total of \$2,630. Orchestra tickets cost \$11 each and balcony tickets cost \$8 each. How many of each type of tickets did the club buy? (Only algebraic solutions will receive credit.)

**32.** After driving at a certain speed for 5 hours Dave realizes that he could have covered the same distance in 3 hours if he had driven 22 mph faster. What distance did he travel during the 5 hour trip? (Only algebraic solutions will receive credit.)

**33.** The length of a rectangle is 7 feet more than its width. The diagonal of the rectangle is 13 feet. Find the dimensions of the rectangle. (Only algebraic solutions will receive credit.)

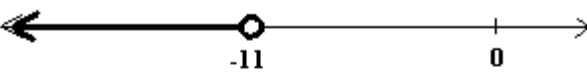
34. The graph below represents the number of students in the library during a 4 hour period. Answer the following questions based on this graph.

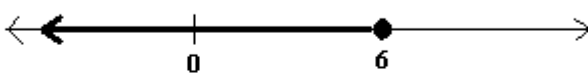



- a) At what time(s) were 200 students in the library?  
 b) How many students were in the library at 4 PM?

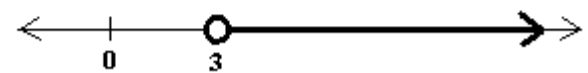
**ANSWERS: MATH 025 FINAL EXAM REVIEW EXERCISES**

1. a) -10 b) 12 c) 8 d) 10 e) -41 f) -88 2. a) -4 b) -4 c) 23 d) -20  
 e) -1 3. a)  $-x^2 - 17xy$  b)  $4x^3 + 8xy$  c)  $2x^2 - 4xy$  d)  $x$  e)  $4x - 4$   
 4. a)  $x = 7/3$  b)  $x = 7$  c) All real numbers d)  $x = -4$  e)  $x = 2$  f) No Solution

5. a)  $a < -11$  

b)  $a \leq 6$  

c)  $a \leq -12$  

d)  $x > 3$  



6. a)  $4x^6 - 9x^4$  b)  $72x^{10}$  c)  $-108x^7y^{17}$  7. a)  $-\frac{5x^2}{2y}$  b)  $\frac{x^4}{2y^8}$  c)  $\frac{4x^5}{y^2}$   
d)  $\frac{3x^6}{4}$  8. a)  $\frac{9}{x^2}$  b)  $\frac{3x}{2y^2}$  c)  $\frac{6}{x^2y}$  d)  $\frac{9x^2 + y^2}{6xy^2}$  e)  $\frac{-1}{7xy}$  9. a)  $\frac{x^8}{y^6}$   
b)  $\frac{4y^{19}}{3x^{12}}$  c)  $\frac{x^7}{y^9}$  d)  $x^2y^8$  10.  $21/4$  11. a)  $x^2 - 6xy + 9y^2$  b)  $x^2 - 9y^2$   
c)  $6x^2 - 11xy - 10y^2$   
d)  $x^3 - 3x^2y - 2xy^2 + 6y^3$  e)  $a^3 + 6a^2b - 3ab - 18b^2$  f)  $x^3 - y^3$  g)  $8x^3 + y^3$

12. a)  $-a^2 + 4ab - 4b^2$  b)  $-2xy + 2y^2$  13. a)  $1 \times 10^3$  b)  $3 \times 10^{-9}$  14.  $6.73 \times 10^{21}$  tons

15. a)  $2(3x+1)(x-1)$  b)  $y(3x-4y)(3x+4y)$  c)  $3y(x+2)(x+1)$  b)  $5xy(y+5x+2)$

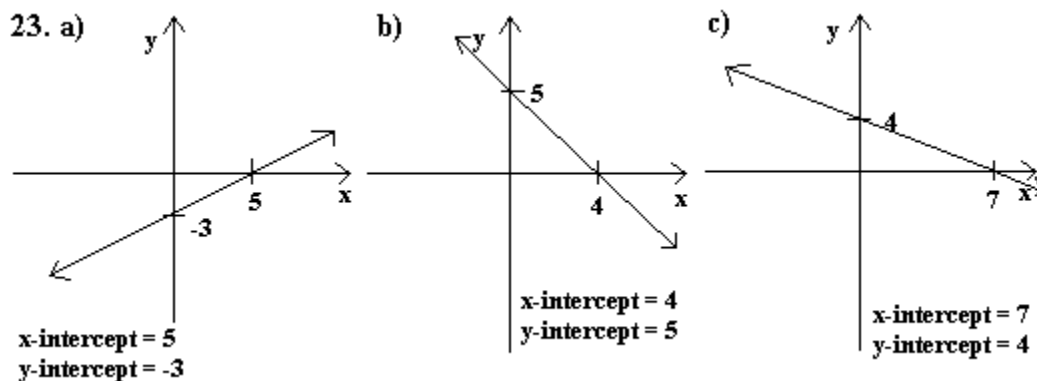
16. a)  $x+9$  R 16 b)  $3x+17$  R 58 c)  $5x-2$  R -1 17. a)  $\frac{x+3}{x}$  b)  $\frac{2x-1}{x-5}$

c)  $\frac{x+5}{x-5}$  d)  $\frac{x+y}{x-y}$  18. a)  $\frac{2x-7}{x(x-7)}$  b)  $\frac{8x+12}{(x+6)(x-6)}$  c)  $2x$  d)  $2$

e)  $\frac{x^2 + 2x - 5}{3(x+1)(x-1)}$  19. a)  $27/20$  b)  $-1/5$  c)  $13/7$  d)  $29/3$  20. 6 by 10

21.  $2(-1) - 4(-3) = -2 + 12 = 10$  22. Let  $x = 3$  and  $y = 2$ . Then  $(3+2)^2 = 5^2 = 25$ .

But  $3^2 + 2^2 = 9 + 4 = 13$ . Since  $(3+2)^2 \neq 3^2 + 2^2$ , then  $(x+y)^2 \neq x^2 + y^2$ .



24. a)  $\frac{2xy}{x+y}$  b)  $a$  c)  $\frac{x-7}{7x}$  25. a)  $4xy^2\sqrt{xy}$  b)  $30x^2y^3\sqrt{10}$

- c)  $-11\sqrt{2}$  d)  $-6\sqrt{3}$  26. a)  $\frac{4\sqrt{3y}}{y}$  b)  $3x\sqrt{2}$  c)  $3\sqrt{7} + 3\sqrt{5}$  27. a)  $x = -4, 7$
- b)  $a = 3/2, 4$  c)  $a = -5, 1/2$  28. a)  $x = 2 \pm \sqrt{5}$  b)  $x = 4 \pm \sqrt{14}$  c)  $x = \frac{-3 \pm \sqrt{33}}{2}$
29. a)  $(-2, 6)$  b)  $(1/5, -1)$  c)  $(-2, -9)$  30. a)  $C = 50 + 30t$  b)  $\frac{C - 50}{30} = t$
31. 130 orchestra tickets and 150 balcony tickets. 32. 165 miles 33. 5 ft. by 12 ft.
34. a) At 11 AM, 3 PM, and 7 PM. b) 150